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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/643,556 | 08/18/2003 | Jesse Dennis Wolfe | IL-11072 | 4907 |
| 7590 | 01/12/2005 | | EXAMINER | |
| James S. Tak Assistant Laboratory Counsel Lawrence Livermore National Laboratory P.O. Box 808, L-703 Livermore, CA 94551 | | | VERSTEEG, STEVEN H | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 1753 | |
| DATE MAILED: 01/12/2005 | | | | |

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/643,556 | WOLFE ET AL. | |
| | Examiner | Art Unit | |
| | Steven H VerSteeg | 1753 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 14 May 2004.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-24 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 18 August 2003 is/are: a) accepted or b) objected to by the Examiner. Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a). Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All
 - b) Some *
 - c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 9/11/03.
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: IDS mailroom date 5/17/04.

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character “24” has been used to designate both “dc power supply” and “pulse controller” (see [0022]). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled “Replacement Sheet” in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.
2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: **26, 33, 34, and 35** (see Figure 2). Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled “Replacement Sheet” in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the

applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The abstract of the disclosure is objected to because “ore” should be “or” in line 2.

Correction is required. See MPEP § 608.01(b).

Claim Objections

4. Claims 10, 12, 22, and 24 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claims 10 and 12 do not provide any structural limitations to the apparatus claims. Claims 10 and 12 merely disclose what happens if additional sputter sources are used. Additional sources are not claimed. Claims 10 and 12 are merely properties, not structural limitations of the apparatus. Claims 22 and 24 do not further limit claims 21 and 23 respectively. The claims are process claims, yet there are only properties claimed. The properties are for what happens when additional sources are used. As claim 21 already requires additional sources, the properties claimed in claims 22 and 24 are inherently present in claim 21. Thus, claims 22 and 24 do not further limit claims 21 and 23 respectively.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 5,851,365 to Scobey in view of *Electrical Dynamics of Pulsed Plasmas* by Belkind et al. (Belkind).

7. For claim 1, Applicant requires a reactive magnetron sputter deposition apparatus for coating a substrate comprising a vacuum chamber evacuated to a low pressure; at least one pulsed DC magnetron positioned within the chamber and having a target source for sputtered particles; means for positioned a substrate within the chamber a long throw distance away from and facing at least one pulsed DC magnetron; and means for providing a reactant gas at the source to form the sputtered particles wherein operation of the pulsed DC magnetron prevents target poisoning by the reactant gas at the target source.

8. For claim 13, Applicant requires a reactive magnetron sputter deposition process comprising providing a vacuum chamber evacuated to a low pressure; providing at least one pulsed DC magnetron positioned within the chamber and having a target source for sputtered particles; providing means for positioned a substrate within the chamber a long throw distance away from and facing the magnetron; and impinging the target with a reactant gas to sputter the particles onto the substrate wherein the operation of the pulsed DC magnetron prevents target poisoning by the reactant gas at the target source.

9. Scobey discloses a reactive magnetron sputtering apparatus and method (title) comprising a vacuum chamber **11**; multiple magnetrons, each with a corresponding target **12, 12a**; a substrate positioning mechanism in the chamber **13** that faces the targets (Figure 3); and means for providing a reactant gas **28**. The target power is DC (col. 7, l. 1-4). The target and substrate are separated by a long throw distance (claim 1).

10. Scobey does not disclose the power supply to the targets and magnetrons to be pulsed DC power.

11. Belkind discloses that when sputtering insulators, it is beneficial to utilize pulsed bias to reduce or eliminate arcing.

12. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Scobey to utilize pulsed power when sputtering because of the desire to prevent or reduce arcing when sputtering insulators.

13. For claims 2 and 14, Applicant requires the means for providing a reactant gas to additionally provide an inert gas at the target. Inert gas is provided (col. 4, l. 53-54).

14. For claims 3 and 15, Applicant requires the low pressure to be below about 1 mTorr. Scobey uses a pressure of 0.05-0.15 mTorr (abstract).

15. For claims 4 and 16, Applicant requires the long throw distance to be greater than about 15 inches. The long throw distance used in Scobey is at least 16 inches (abstract).

16. For claims 5 and 17, Applicant requires the target source to be smaller than the width/area of the substrate to be coated. For claims 6 and 18, the target is smaller by a factor of at least 3. Scobey's substrate is 15 inches in width (col. 5, l. 14-19) and the target is 4 inches (col. 5, l. 63-65). 15 inches is more than 3 times 4 inches.

17. For claims 7 and 19, Applicant requires the long throw distance to be a function of the width area of the substrate to be coated. For claims 8 and 20, Applicant requires the long throw distance to be a function of the number of pulsed DC magnetron/target sources. The limitations are inherent.

18. For claims 9 and 21, Applicant requires a plurality of pulsed DC magnetrons having a corresponding plurality of target sources. Scobey uses two magnetrons with targets (Figure 3).

19. For claims 10 and 22, Applicant requires each additional target source to reduce the partial pressure of the reactant gas of every target source without a corresponding reduction in the impingement ratio due to the increase in total ionization provided thereby. The limitation is merely a property and inherent in the fact that there are additional sources.

20. For claims 11 and 23, Applicant requires the means for providing a reactant gas to additionally provide an inert gas at each target source to form the sputtered particles. Scobey shows that the gas is fed to each target individually (Figure 3).

21. For claims 12 and 24, Applicant requires each additional target source to reduce the partial pressure of the inert gas for every target source to maintain the low pressure within the vacuum chamber. The limitation is merely a property and inherent in the fact that there are additional sources.

General Information

For general status inquiries on applications not having received a first action on the merits, please contact the Technology Center 1700 receptionist at (571) 272-1700.

For inquiries involving Recovery of lost papers & cases, sending out missing papers, resetting shortened statutory periods, or for restarting the shortened statutory period for response, please contact Denis Boyd at (571) 272-0992.

For general inquiries such as fees, hours of operation, and employee location, please contact the Technology Center 1700 receptionist at (571) 272-1300.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H VerSteeg whose telephone number is (571) 272-1348. The examiner can normally be reached on Mon - Thurs (6:30 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Steven H VerSteeg
Primary Examiner
Art Unit 1753

shv
January 10, 2005